PATENT SPECIFICATION

DRAWINGS ATTACHED

1,008,550

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COMPLETE SPECIFICATION

Improvements in Castors

We, HOMA ENGINEERING LIMITED, a British Company, of Homa Works, Cosby, Leicestershire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to castors for wheeled appliances or vehicles.

The invention is, moreover, concerned with swivel castors of the kind comprising a swivelling component rotatably mounted on a stub axle which is adapted to be secured to the appliance or vehicle concerned, the swivelling component being furnished with a spindle having rotatably mounted thereon a castor wheel—customarily, but not necessarily, provided with a moulded rubber tyre. The castor is normally mounted on an appliance or vehicle with the aforesaid stub axle in a vertical position and extending downwardly into the swivelling component, this latter, including the castor wheel, being rotatable about the vertical axis of the stub axle. Such a castor will, for convenience, be hereinafter referred to as of the kind concerned.

The invention has been devised primarily in connection with heavy duty castors applicable to, for example, trailers and trucks and capable of supporting a weight exceeding one ton, but it is to be understood that there is no limitation in this respect.

In one particular construction of a castor of the kind concerned, the stub axle depends from a top plate or peg adapted to be secured to or in a wheeled appliance or vehicle, and its lower end is screw threaded, the axle extending through a boss constituting part of the swivelling component and the latter being held on the axle by a nut screwed on to the downwardly projecting screw-threaded end of the axle so as to abut against the underside of the boss. In addition, when the castor is fixed in position, the spindle which supports the castor wheel and is carried by two legs depending from the aforesaid boss, is not disposed directly beneath the axis of the stub axle but is off-set from this axis.

However, a castor of this construction has several disadvantages. Since the castor wheel spindle is off-set from the vertical axis of the stub axle, when the castor is in use, the swivelling component exerts unbalanced forces on the stub axle at several places along its length. These unbalanced forces strive to bend the stub axle and, as a result, the axle is liable to eventually break. The nut holding the swivelling component on the axle may be forced off the latter by the swivelling component.

The object of the present invention is to obviate these disadvantages and to provide an improved castor of the kind concerned.

In accordance with the invention, there is provided a castor of the kind concerned in which the swivelling component is mounted on the stub axle through the medium of two sets of taper roller bearings interposed between the stub axle and the swivelling component at axially spaced locations along the axle, the rollers of the two sets being individually tapered in respectively opposite directions and their axes being inclined to the axis of the stub axle in said opposite directions.

Each set of taper roller bearings may be of conventional form; manifestly, however, each roller is disposed with its axis at an inclination to the axis of the stub axle and is tapered along its length, the angle of taper being commensurate with the angle of inclination of its axis to the stub axle axis so that, in operation, the rollers perform a true rolling action. In addition, each set of bearings conventionally includes two races between which the rollers are interposed, one race being secured on the stub axle and the other being secured to the swivelling component. The rollers between the two races are held apart from each other by a cage in the usual way.

Preferably, the rollers of the two sets of

bearings are individually tapered and inclined to the stub axle axis in directions towards one another. Thus, with the castor mounted in position, the rollers of the upper set of bearings taper in the downwards direction and those in the lower set of bearings taper in the upwards direction.

As will be appreciated, each set of bearings is capable of sustaining radial and thrust loads, i.e. loads exerted at right angles to the axis of the stub axle and parallel to this axis respectively. Thus, the arrangement of the two sets of bearings specified above has the effect that forces applied to the upper set are counter-balanced by forces applied to the lower set, and vice versa. In other words, the reactions of the tapered rollers of the two sets are equal and opposite and hence balance out each other. In addition, the two sets of bearings share the load applied to the swivelling component.

Simple and inexpensive seals can be used to seal the two sets of bearings from the outside. Thus, in accordance with a further optional feature of the invention, an inverted dish-shaped seal of spring steel and having a central aperture therein may be fitted against the upper end of the inner race of the upper set with its lower edge abutting against the associated outer race, and a similar dish-shaped seal may be fitted against the lower end of the inner race of the lower set with its upper edge abutting against the associated outer race.

These seals may be secured in position in various ways, but a preferred manner of securing the seals will be described in detail below.

A preferred embodiment of a castor according to the invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a side view, partly in section, of a castor, and

Figure 2 is an end view, also partly in section, of the castor.

In the drawings there is shown a swivel castor of the kind concerned comprising a swivelling component 1 which is rotatably mounted on stub axle 2 adapted to be secured to a wheeled appliance or vehicle.

The stub axle 2 depends from an integral oblong-shaped top plate 3 which is intended to be secured, for example, by bolts, to the underside of the appliance or vehicle. The stub axle 2 and the top plate 3 are drop forged, and the axle has its lower end portion of a smaller diameter than the upper portion adjoining the top plate. The lower end of the stub axle is screw threaded.

The swivelling component 1, also drop forged, comprises a boss 4 which is formed with a central bore through which the stub axle 2 extends, the lower screw-threaded end of the stub axle projecting from the underside of the boss and carrying a nut 5 which holds the component on the stub axle. The boss 4 has welded thereto two depending parallel legs 6 which form a fork. The lower ends of these legs 6 carry a spindle 7 which is constituted by a bolt passed through apertures in the lower ends of the legs 6 and secured by means of a nut 8. Rotatably mounted on the spindle 7, through the medium of bearings 9 is a castor wheel 10 located between the fork of the legs 6 and fitted with a moulded rubber tyre 11. As is apparent from the drawings, the spindle 7 carrying the castor wheel is not disposed directly beneath the vertical axis of the stub axle 2 but is offset from this axis.

In accordance with the present invention, two sets of taper roller bearings 12,13 are interposed between the stub axle 2 and the surrounding boss 4 of the swivelling component 1 at axially spaced locations along the axle.

These two sets of taper roller bearings 12,13 are basically of the same conventional construction. Thus, each set comprises a series of tapered rollers 14 which are disposed between an inner race 15 and an outer race 16 and are held apart from one another by a cage 17.

The inner race is rigidly fixed to the stub axle 2 and the outer race is secured to the boss 4 of the swivelling component. As can be seen in Figure 1 of the drawings, the upper set of bearings 12 is disposed around the upper portion of the stub axle 2 and the lower set 13 is arranged around the lower portion of a reduced diameter.

In addition, the upper set of bearings 12 is of a larger size than the lower set 13, and the boss 4 is appropriately recessed at its upper and lower surfaces around the central bore therein to receive the upper and lower sets of bearings respectively. Thus, the two sets of bearings are maintained at axially spaced locations along the stub axle 2.

Each roller 14 is disposed with its axis at an inclination to the axis of the stub axle 2 and is tapered along its length, the angle of taper being commensurate with the angle of inclination of its axis to the stub axle axis so that, in operation, the rollers 14 perform a true rolling action on the opposed surfaces of the inner and outer races 15 and 16. Moreover, the rollers 14 of the two sets of bearings taper in directions towards one another, the rollers 14 of the upper set being tapered in the downwards direction and those in the lower set tapered in the upwards direction. Manifestly, therefore, the axes of the two sets of rollers are inclined to the stub axle axis in the said opposite directions.

The upper surface of the outer race 16 of the upper set of bearings 12 is flush with the upper surface of the boss, and the inner race 15 of this set projects upwardly beyond the confines of the boss and abuts against the underside of the top plate 3. An inverted

dish-shaped seal 18 having a central aperture therein and of spring steel serves to seal the upper set of bearings from the outside. The margin of this seal around its central aperture is trapped between the upper surface of the inner race 15 and the underside of the top plate 3, and the lower edge of the seal abuts resiliently against the upper surface of the outer race 16.

As regards the lower set of bearings 13, the under surface of the outer race 16 is substantially flush with the lower surface of the boss 4, and the inner race projects downwardly beyond these surfaces and abuts against the nut 5 holding the swivelling component 1 on the stub axle 2. A dish-shaped seal 19 of the same form as the seal 18 serves to seal the lower set of bearings from the outside, the margin of the central aperture therein being clamped between the underside of the inner race 15 and the nut 5 with the upper edge of the seal abutting resiliently against the undersurface of the outer race 16.

Accordingly, as will be appreciated, when the nut 5 is screwed on to the stub axle 2 to secure the swivelling component to the stub axle and firmly locate the two sets of bearings 13,12 in position, the seals 18,19 are simultaneously clamped in position.

WHAT WE CLAIM IS:—

1. A castor of the kind concerned, wherein the swivelling component is mounted on the stub axle through the medium of two sets of taper roller bearings interposed between the stub axle and the swivelling component at axially spaced locations along the axle, the rollers of the two sets being individually tapered in respectively opposite directions and their axes being inclined to the axis of the stub axle in said opposite directions.

2. A castor according to Claim 1, wherein the rollers of the two sets of bearings are individually tapered and inclined to the stub axle axis in directions towards one another so that, with the castor mounted in position, the rollers of the upper set of bearings taper in the downwards direction and those in the lower set of bearings taper in the upwards direction.

3. A castor according to Claim 1 or 2, wherein an inverted dish-shaped seal of spring steel and having a central aperture therein is fitted against the upper end of the inner race of the upper set of bearings with its lower edge abutting against the associated outer race, and a similar dish-shaped seal is fitted against the lower end of the inner race of the lower set of bearings with its upper edge abutting against the associated outer race, these seals sealing the two sets of bearings from the outside.

4. A castor according to Claim 1, 2 or 3, wherein the stub axle depends from a top plate or peg adapted to be secured to or in a wheeled appliance or vehicle and has its lower end screw threaded, and the swivelling component comprises a boss formed with a central bore through which the stub axle extends, and two legs depending from the boss and supporting the spindle carrying the castor wheel, the boss of the swivelling component being held on the stub axle by a nut which is screwed on to the downwardly projecting screw-threaded end of the stub axle so as to abut against the underside of the boss.

5. A castor according to Claim 4, wherein the upper set of bearings is of a larger size than the lower set, and the lower end portion of the stub axle carrying the lower set of bearings is of a reduced diameter, the boss being recessed at its upper and lower surfaces around the central bore therein through which the stub axle extends, to receive the upper and lower sets of bearings respectively.

6. A castor according to Claims 3 and 5, wherein the margin of the upper inverted seal around the aperture therein is trapped between the upper surface of the inner race of the upper set of bearings and the underside of the top plate or peg, and the said margin of the lower seal is clamped between the underside of the inner race of the lower set of bearings and the nut holding the swivelling component on the stub axle.

7. A castor substantially as herein described with reference to the accompanying drawings.

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1 SHEET This drawing is a reproduction of the Original on a reduced scale

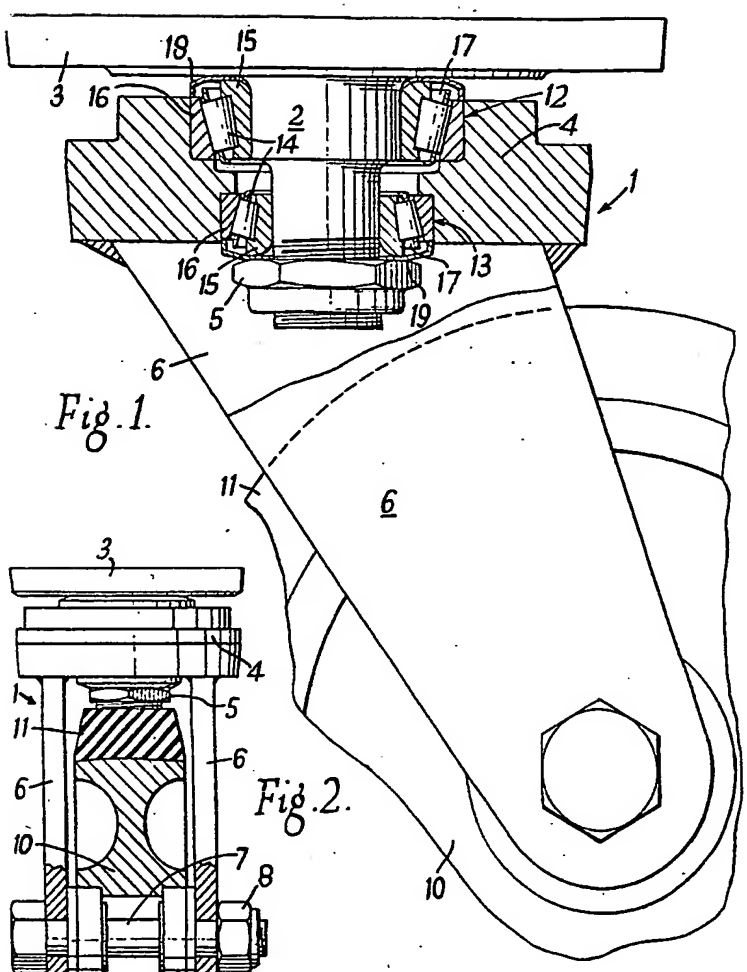

Fig. 1.

Fig. 2.